

**Oroville Facilities Relicensing Efforts  
Environmental Work Group  
Draft Narrative Reports for Resource Action Discussion**

**Resource Action:** EWG-22

**Task Force Recommendation Category:** 2

**Improve Connectivity of Floodplain to the Feather River Through Levee Setbacks**

**Date of Field Evaluation:** No field evaluation has been conducted.

**Evaluation Team:** Richard Harris, Koll Buer, and Bruce Ross

**Description of Potential Resource Action Measure:**

Increase connectivity between the river channel and adjacent floodplain habitats (including low-elevation terraces) in the lower Feather River by setting back levees to create seasonal habitats for Chinook salmon, splittail, and steelhead.

The following resource actions are either similar to or directly related to the proposed measure:

- EWG-19A, aimed at modifying or creating floodplains in the lower Feather River.
- EWG-16A and EWG-16B, measures aimed at enhancing or creating side channel habitats in the Feather River.

**Nexus to Project:**

The Oroville project does not directly affect levees in the lower Feather River. The levees are mainly in place for flood prevention. The levees are generally capable of confining flows less than or equal to 150,000 cubic feet per second (cfs) and the Oroville project is obligated to prevent releases of higher magnitude than that.

**Potential Environmental Benefits:**

The benefits of increasing connectivity between the river and its floodplain would include improvements in fish habitats and increased availability of land for recruitment and development of riparian vegetation. Improved riparian vegetation conditions would in turn, benefit wildlife that use riparian habitats.

**Potential Constraints:**

The principal constraints to implementing levee setbacks are the willingness of the U.S. Army Corps of Engineers (USACE), local jurisdictions or landowners to permit such projects.

**Existing Conditions in the Proposed Resource Action Implementation Area:**

The lower Feather River (especially below Gridley) is presently incised well below its former floodplain (10-25 feet). Studies conducted by DWR indicate that the Rosgen classification for the lower Feather River is “entrenched, F channel type.” Prior to the placement of levees, hydraulic mining, and subsequent downcutting, the lower Feather River was a meandering C channel type, comparable to the Sacramento River and other streams draining to the Central Valley. At intervals of approximately 1-2 years it

**Oroville Facilities Relicensing Efforts  
Environmental Work Group  
Draft Narrative Reports for Resource Action Discussion**

would have experienced overbank flooding onto its adjacent floodplain. At the present time, only floods in excess of approximately 50,000 cfs would cause flooding out of the entrenched channel. These have occurred about a dozen times over the past 40 years. High magnitude flooding events (>100,000 cfs) have occurred three times, in 1965, 1986 and 1997.

The levee system that protects land adjacent to the river from flooding is not uniformly close to the stream. In some locations, for example, in the developed areas of the cities of Oroville and Yuba City, levees do completely cut off the stream from its floodplain. In other locations, levees may be absent altogether from one or the other side of the river (e.g., Sutter Bypass). There are a number of places, especially on point bars, where levees are set back over 1,000 feet and agricultural uses are occurring within the levee boundaries.

The levee system below Thermalito is part of the Sacramento River Flood Protection Project and any proposals to modify the system would have to be approved by the USACE and overcome various institutional barriers inherent in maintaining flood protection.

The physical constraints preventing the Feather River from accessing its former floodplain are the degree of incision and the flow regime itself that prevents flooding events of magnitudes less than the 100 year flood. Levees are a constraint only in specific places in the lower Feather River. Where they are a constraint, flood hazard considerations may be paramount.

The land ownership below Thermalito is almost exclusively private, although there is some DFG ownership around River Mile (RM) 10 to RM 11. Any proposal to increase floodplain connectivity would be constrained by the willingness of landowners to either sell their land or allow the Resource Action measure on their land.

With the exception of some reaches (RM 39 to RM 54, RM 34 to RM 35.5), within the existing channel between the levees there are relatively few floodplain surfaces. Those that exist are mostly sand substrate. The channel bottom itself is heavy clay. Consequently, there are not many suitable sites for enhancement of salmonid habitat. Existing information indicates that anadromous salmonids do not spawn in the lower Feather River below Gridley (Koll Buer, personal communication).

Most existing deposits within the incised channel are inundated by flows greater than 10,000 cfs. During the summer months flows are relatively high due to water supply releases for downstream uses. For example, under current project operations, median daily flows in August are about 6,000 cfs. During most winter months, existing impaired (i.e., operational) flows exceed estimated unimpaired flows in the lower Feather River. It is mostly during the spring runoff season that impaired flows are lower than unimpaired flows (i.e., when the reservoir is filling). Thus, the impaired flow regime does not resemble the unimpaired regime either in timing, magnitude, or duration of peak flows.

**Oroville Facilities Relicensing Efforts  
Environmental Work Group  
Draft Narrative Reports for Resource Action Discussion**

**Design Considerations and Evaluation:**

Under the current conditions (including the current regulated flow regime), removing or relocating levees in and of itself would not reconnect the stream to its floodplain. It would be appropriate to consider levee set backs along with geomorphic restoration (EWG-19A) and side channel enhancement and/or creation (EWG-16A and EWG-16B) together as a comprehensive approach to improving the functioning of the lower Feather River. However, if EWG-22 is to be further evaluated independently, several questions would need to be answered:

- *Where should levee setbacks be placed to maximize their benefits?* There are some specific locations that we have not yet identified where levees may be the main constraint on floodplain connectivity. These could be considered for project implementation. However, the ecological benefit of these projects is likely to be very localized.
- *Are lands available for levee setbacks in the appropriate locations?* Assuming that some locations are suitable, landowner willingness would have to be determined.
- *Would levee setbacks provide any benefits under the current regulated flow regime?* As previously discussed, at the present time, the main floodplain is well above the stream and only inundated by extreme peak flows.
- *What flow regime would maximize benefits?* If any sites seem appropriate for levee removal, there would need to be an analysis of what streamflows would be necessary to maximize their ecological benefits.
- *How do any proposed setbacks adhere to the Comprehensive Study's Guiding Principles?* The Comprehensive Study has outlined a structure by which the flood protection project may be modified.

**Synergism and Conflicts:**

There are potential synergisms associated with combining the design and analysis of this measure with other measures proposing geomorphic restoration, habitat improvements or flow management. This measure could potentially conflict with flood management requirements and local landowner objectives.

**Uncertainties:**

In addition to several unknowns previously mentioned, one important uncertainty would be the effects of local levee removals on channel behavior and downstream or upstream flooding. An additional uncertainty would be the requirement for a complementary flow regime.

**Cost Estimate:**

The scope of potential levee relocation is unknown so a cost cannot be assigned. However, the cost items would include land acquisition (estimated at \$2,000/acre), excavation (estimated at \$12/cubic yard), reconstruction of the levee (unit costs unknown) and erosion protection/revegetation (hydroseeding at \$2,500/acre or planting

**Oroville Facilities Relicensing Efforts  
Environmental Work Group  
Draft Narrative Reports for Resource Action Discussion**

at up to \$8,000/acre). Additional cost information may be available from sources such as the USACE.

**Recommendations:**

Preliminary evaluation of this Resource Action indicates that it would probably provide relatively few enhancements to the lower Feather River, and more important, may not be possible to achieve. To achieve its goal of increasing connectivity of the floodplain to the lower Feather River for the benefit of creating and enhancing fish habitat, this Resource Action should be combined with other Resource Actions (i.e., EWG-16A/B, EWG-17, and EWG-19A) if an aggressive habitat construction approach is to be implemented in the lower Feather River. However, if some site-specific benefits are desired from levee setbacks unaccompanied by other Resource Actions, additional information would be needed to identify appropriate and available sites.